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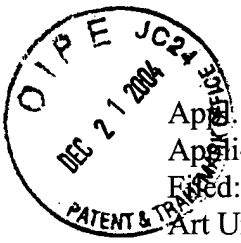
Attorney's Docket No. 038190/201827 PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	10/016,277	Confirmation No.: 3510
Applicant(s):	Peter Hsiuen Wu	
Filed:	November 2, 2001	
Art Unit:	1756	
Examiner:	Ruggles, John S.	
Title:	RADIATION CURABLE MASKANT AND LINE SEALER FOR PROTECTING METAL SUBSTRATES	

Docket No.: 038190/201827
Customer No.: 00826

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Alexandria, VA 22313-1450

APPEAL BRIEF TRANSMITTAL
(PATENT APPLICATION – 37 C.F.R. § 41.37)

1. Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on October 21, 2004.

2. ☐ Applicant claims small entity status.

3. Pursuant to 37 C.F.R. § 41.20(b)(2), the fee for filing the Appeal Brief is:
   ☐ small entity $250.00
   ☒ other than small entity$500.00

   Appeal Brief fee due $500.00

☒ Any additional fee or refund may be charged to Deposit Account 16-0605.

Respectfully submitted,

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Tracey S. Wright

Tracey S. Wright

Attorney's Docket No. 038190/201827 PATENT

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APPEAL BRIEF UNDER 37 CFR § 41.37

This Appeal Brief is filed pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" filed October 21, 2004.

1. ***Real Party in Interest***

The real party in interest in this appeal is The Boeing Company, the assignee of the above-referenced patent application.

2. ***Related Appeals and Interferences***

There are no related appeals and/or interferences involving this application or its subject matter.

3. ***Status of Claims***

Claims 1-49 are pending and all claims stand rejected as unpatentable over various combinations of prior art references as set forth in greater detail below. The prior art rejections of all pending claims is appealed herein.

4. ***Status of Amendments***

There are no amendments that have not been entered. The claims set forth in the attached appendix include all amendments submitted during prosecution.

5. ***Summary of Claimed Subject Matter***

The present invention provides an improved maskant and line sealer for protecting metal substrates, such as aircraft fuselage panels, that do not require the presence of water or other solvents that can lead to increased toxicity and undesirably long drying times (see Applicant's Background of the Invention section, pages 1-2). To overcome the problems associated with prior art maskant compositions, Applicant has developed a substantially solvent-free and actinic radiation curable masking composition. The compositions of the invention exhibit greatly reduced curing times and reduce the need for reapplication of the maskant. Additionally, the compositions of the invention pose fewer toxicity or environmental concerns because use of toxic organic solvents is avoided. As noted in Claim 1, the method of the invention comprises applying a maskant coating that is radiation curable and substantially solvent-free. As recited in dependent Claim 3, the maskant composition may comprise at least one polymerizable monomer or oligomer and a photoinitiator.

6. ***Grounds of Rejection to be Reviewed on Appeal***

The Office Action includes five rejections under 35 U.S.C. §103(a) involving a combination of the Maeda reference with one or more additional references. Specifically, Claims 1-15 and 17-18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Maeda reference in view of U.S. Patent No. 5,773,487 to Sokol, U.S. Patent No. 5,260,350 to Wright and U.S. Patent No. 5,571,570 to Lake. Claims 16, 19-21, 26, 28-32, 35, 39-42 and 43-46 stand rejected as being unpatentable over the Maeda, Sokol, Wright and Lake references, and further in view of either U.S. Patent No. 5,126,005 to Blake or U.S. Patent No. 4,585,519 to Jaffe *et al.* Claims 22-23, 27, 33-34, 37-38, and 48-49 stand rejected as being unpatentable over the combination of the Maeda, Sokol, and Blake or Jaffe references. Claims 24-25 and 36 stand rejected as being unpatentable over the Maeda reference in view of either Blake or Jaffe, further

in view of Sokol and further in view of U. S. Patent No. 6,136,880 to Snowwhite *et al.* Claim 47 stands rejected as being unpatentable over the Maeda and Sokol references in view of either Blake or Jaffe and further in view of U.S. Patent No. 4,716,270 to Gnanamuthu *et al.* In each rejection, the Examiner alleges that one of ordinary skill in the art would be motivated by Sokol to replace the water-based maskant composition of Maeda with the composition described in Sokol.

7. ***Argument***

Each argument set forth below applies equally to each rejection of record.

No Motivation to Combine Maeda and Sokol

Applicants respectfully submit that one of ordinary skill in the art would have no motivation to combine the Maeda and Sokol references as contemplated by the Examiner. The Maeda reference is directed to water-based maskant compositions and merely describes a prior art maskant composition that requires extensive drying to remove the water present in the composition. The Maeda reference notes in columns 1-2 that prior attempts to formulate a water-based maskant produced inferior results due to interaction of the coating with the alkali etchant bath (e.g., swelling of the mask), poor coating workability, and poor peelability. The Maeda reference teaches that the water-based formulation described therein provides good peelability and coating characteristics, as well as resistance to chemical attack. Clearly, all of the above characteristics are crucial to the application described in Maeda (i.e., a chemical milling maskant).

The Sokol reference, which is the only reference relied upon by the Examiner as teaching a solvent-free and radiation curable coating, is directed to compositions for use as finishing coatings for household items (see column 1, lines 18-44). There is absolutely no suggestion in the Sokol reference that the compositions described therein would be suitable for use as a peelable maskant composition resistant to an etching bath as required in the Maeda reference, as well as the Jaffe and Blake references. Sokol does not mention chemical milling maskant as a possible application for the coatings described therein. Further, there is nothing in the Sokol reference that describes the peelability or chemical resistance characteristics of the coatings

discussed therein, which is not surprising since the focus in Sokol is on finishing coatings that are not intended for exposure to harsh chemical attack or intended to be peeled.

The Examiner has not explained why one of ordinary skill in the art would have the reasonable belief that the coatings of Sokol would meet the stringent requirements of a chemical milling maskant. It is not reasonable to conclude that one of ordinary skill in the art would be motivated to substitute the coating formulation of Sokol in the application described in Maeda simply because Sokol mentions that avoidance of volatile organic solvents can provide environmental benefits such as reduced fire risk and reduced deleterious health effects. Since the Maeda reference already describes the use of water-based formulations that contain no volatile organic solvents, the advantages of avoiding volatile organic solvents taught by Sokol would provide no motivation to modify the composition of Maeda. It is also insufficient to argue that the motivation arises from Sokol's description of quick curing of the polymerizable composition described therein. The coating composition of Maeda is polymerized prior to coating using a latex emulsion polymerization process, so the Maeda composition is not cured after coating, only dried to remove water. Thus, the quick curing described in Sokol is irrelevant to the type of coating described in Maeda.

Further, one of ordinary skill in the art would certainly read the Maeda reference as requiring a coating that meets a number of performance criteria other than simply being capable of adhering to metal. Peelability and chemical resistance, for instance, are key requirements described in Maeda. The Examiner has not explained how the Sokol reference would suggest that the coatings described therein would meet such requirements. Instead, the office action dated 1/30/04 merely includes the statement that "a solvent free radiation curable acrylate coating ... would be expected to yield a peelable maskant functional in the process of Maeda." This statement is completely unsupported by any evidence of record. The Examiner's only other comment on this point is to note in the Advisory Action that the recognition of another advantage naturally flowing from the suggestion of the prior art cannot be the basis for patentability. However, Appellant is arguing precisely that there is no underlying suggestion in the art to arrive at the invention presently claimed.

Appellant respectfully submits that Sokol cannot be read to suggest that the coatings described therein would have the characteristics required by Maeda, and only impermissible

hindsight would lead one to the combination proposed by the Examiner. One of ordinary skill in the art would simply find nothing in Sokol that provides a reasonable expectation that the Sokol coatings would function successfully in the application described in Maeda, which undermines any prima facie argument of obviousness based on these two references.

This conclusion becomes inescapable when considered in light of the discussion in Maeda of failed prior attempts to produce a workable maskant that avoids the use of volatile organic solvents. Due to the harsh environment produced by chemical milling baths and the need for peelability and good coating characteristics, it is difficult to produce a coating suitable for use as a maskant in a chemical milling application. This is made abundantly clear in the background discussion of Maeda. Sokol provides nothing to lead one of ordinary skill in the art to reasonably believe that the coatings of Sokol would have the necessary characteristics needed for a successful chemical milling maskant. Since the Examiner has failed to rebut this argument, Appellant requests reversal of all rejections that rely on a combination of Maeda and Sokol.

Appellant also traverses the Examiner's repeated allegation that Maeda is directed to a radiation curable composition. The Examiner appears to be alleging that Maeda can be properly combined with other cited references on this basis. For instance, in the most recent office action, the Examiner states that "Maeda, Sokol, and Wright all relate to the same art of radiation curing of an acrylate coating composition." (page 6). The Examiner also states that Maeda describes "drying or curing a coating by far infrared rays." (emphasis added) (page 3). This is simply untrue. The Maeda reference does not relate to radiation curing and does not describe any radiation curable compositions. There is no discussion of anything other that simply drying (i.e., solvent evaporation) by radiation (column 7, lines 45-46). No photoinitiators are discussed. There is no reason to believe that radiation curing, which suggests a polymerization or cross-linking reaction triggered by radiation exposure, is envisioned at all in Maeda.

Maeda Does Not Teach Curing a Coating After Application

As recited in each pending claim, the maskant of the invention is applied to the substrate and thereafter exposed to actinic radiation in order to cure the coating. The Examiner alleges that Maeda describes curing a coating after deposition onto a substrate. As noted above, the portion of column 7 relied upon by the Examiner mentions drying of the coating, not curing. A

drying step would be understood by one of ordinary skill in the art to mean evaporation of water. Drying and curing are not synonymous. Curing implies a polymerization or cross-linking reaction, which clearly does not occur after coating deposition in Maeda. Appellant directs the Board's attention to the summary section of Maeda where it states that the maskant composition includes a copolymer (a), which obviously suggests that polymerization has already taken place. The Maeda reference teaches that the copolymer (a) can be prepared using the monomers, emulsifiers, and initiators described in columns 3-4. However, it is clear that the copolymer is formed by emulsion polymerization and then mixed with the remaining components (See column 5, lines 43-47, and the examples which include headings reciting "Preparation of copolymer latex (a)" and separate headings entitled "Preparation of water based maskant composition"). Thus, there is no support for the Examiner's contention that Maeda is directed to radiation curing, and particularly no support for the contention that a curing step takes place after depositing the coating described in Maeda. Contrary to statements made in the office actions, Maeda does not suggest the steps of applying a radiation curable composition and then exposing the coated substrate to actinic radiation to cure the maskant as recited in Claim 1 of the present application. For this additional reason, Appellant respectfully submits that all pending claims are patentable over the cited references and requests reversal of all rejections of record that rely on Maeda in this manner.

CONCLUSION

In view of the foregoing arguments, Appellant respectfully submits that Claims 1-49 are patentable over the cited references. A decision from the Board of Patent Appeals and Interferences reversing the final rejection of the pending claims is therefore earnestly solicited.

Respectfully submitted,

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Tracey S. Wright

CLAIMS APPENDIX

1. (original) A method of protecting selected portions of a metal substrate from chemical exposure, comprising:

applying a maskant coating composition to at least a portion of the surface of a metal substrate, the maskant composition being radiation curable and substantially solvent-free;

exposing the coated substrate to actinic radiation to cure the maskant composition and form a cured peelable maskant film adhered to the metal substrate; and

subjecting the coated substrate to a chemical treatment.

2. (original) The method of Claim 1, wherein the metal substrate is selected from the group consisting of aluminum, steel, titanium and alloys thereof.

3. (original) The method of Claim 1, wherein the maskant composition comprises at least one polymerizable monomer or oligomer and a photoinitiator.

4. (original) The method of Claim 3, wherein the at least one polymerizable monomer or oligomer is selected from the group consisting of acrylates, diacrylates, urethane acrylates or diacrylates, and mixtures thereof.

5. (original) The method of Claim 3, wherein the at least one polymerizable monomer or oligomer is selected from the group consisting of isobornyl acrylate, isooctyl acrylate, aliphatic urethane acrylate, aliphatic polyester-based urethane acrylate, aromatic urethane acrylate, siliconized urethane acrylate, polybutadiene urethane diacrylate, and mixtures thereof.

6. (previously presented) The method of Claim 3, wherein the photoinitiator is selected from the group consisting of 1-hydroxycyclohexyl phenyl ketone, bis (2,6-dimethoxybenzoyl)-2,4-,4-trimethylpentyl phosphine oxide, 2-hydroxy-2-methyl-1-phenyl-propan-1-one, trimethylbenzophenone, methylbenzophenone, bis acyl phosphine oxide, and mixtures thereof.

7. (original) The method of Claim 3, wherein the maskant composition further comprises a filler.

8. (original) The method of Claim 7, wherein the filler is selected from the group consisting of talc and fumed silica.

9. (original) The method of Claim 1, wherein said exposing step comprises exposing the coated substrate to ultraviolet radiation, black light radiation or visible light radiation.

10. (original) The method of Claim 1, wherein said exposing step comprises exposing the coated substrate to ultraviolet radiation by moving the substrate past at least one ultraviolet light or moving the ultraviolet light past the substrate.

11. (previously presented) The method of Claim 1, wherein said exposing step comprises exposing the coated substrate to at least one ultraviolet radiation source having a wavelength of about 200 nm to about 450 nm and an intensity of about 120 W/cm^2 to about 185 W/cm^2.

12. (original) The method of Claim 1, wherein said exposing step comprises exposing the coated substrate to radiation at a rate of about 1 to about 10 feet of substrate/minute.

13. (original) The method of Claim 1, wherein the cured maskant film has a thickness of about 5 to about 20 mils.

14. (original) The method of Claim 1, wherein the cured maskant film has a peel strength of about 3 oz./inch to about 30 oz./inch.

15. (original) The method of Claim 1, wherein said applying step comprises applying the maskant composition by spraying the composition, applying the composition with a roller, applying the composition with a blade, or by dipping the substrate in the maskant composition.

16. (original) The method of Claim 1, wherein the metal substrate has a first side and a second side, and said method comprises:

applying the maskant coating composition to at least a portion of the first side of the metal substrate;

exposing the first coated side of the substrate to actinic radiation to cure the maskant composition and form a cured peelable maskant film adhered to the first side of the metal substrate;

applying the maskant coating composition to at least a portion of the second side of the metal substrate; and

exposing the second coated side of the substrate to actinic radiation to cure the maskant composition and form a cured peelable maskant film adhered to the second side of the metal substrate.

17. (original) The method of Claim 1, wherein the chemical treatment is selected from the group consisting of chemical milling, anodizing and deoxidizing.

18. (original) The method of Claim 1, wherein said subjecting step comprises immersing the substrate in a chemical bath.

19. (original) A method of protecting selected portions of a metal substrate from chemical exposure, comprising:

applying a maskant coating composition to at least a portion of the surface of a metal substrate;

curing the maskant coating composition to form a cured peelable maskant film adhered to the metal substrate;

scribing a predetermined pattern of lines in the maskant film, the scribed lines outlining portions of the maskant film to be removed;

applying a sealant composition to the scribed lines in the maskant film, the line sealant composition being radiation curable and substantially solvent-free;

exposing the line sealant composition to actinic radiation to cure the line sealant composition;

peeling off a portion of the maskant film outlined by the scribed lines; and

subjecting the coated substrate to a chemical treatment.

20. (original) The method of Claim 19, wherein the line sealant composition comprises at least one polymerizable monomer or oligomer and a photoinitiator.

21. (original) The method of Claim 20, wherein the at least one polymerizable monomer or oligomer is selected from the group consisting of acrylates, diacrylates, urethane acrylates or diacrylates, and mixtures thereof.

22. (original) The method of Claim 20, wherein the at least one polymerizable monomer is selected from the group consisting of isobornyl acrylate, isooctyl acrylate, urethane acrylate, and mixtures thereof.

23. (original) The method of Claim 20, wherein the photoinitiator is selected from the group consisting of bis acyl phosphine oxide, 1-hydroxycyclohexyl phenyl ketone, and mixtures thereof.

24. (original) The method of Claim 20, wherein the line sealant composition further comprises a wax and a synergist.

25. (original) The method of Claim 24, wherein the synergist is triethanolamine.

26. (original) The method of Claim 19, wherein said step of applying the line sealant composition comprises applying the sealant composition with a roller or applying the sealant composition with cheesecloth.

27. (original) The method of Claim 19, wherein said step of exposing the line sealant composition to actinic radiation comprises exposing the sealant composition to ultraviolet radiation, black light radiation or visible light radiation.

28. (previously presented) The method of Claim 19, wherein said step of exposing the line sealant composition to actinic radiation comprises exposing the sealant composition to a radiation source emitting radiation at a wavelength of about 200 to about 450 nm and having an intensity of about 100 W/cm^2 to about 600 W/cm^2 .

29. (original) The method of Claim 19, wherein the metal substrate is selected from the group consisting of aluminum, steel, titanium and alloys thereof.

30. (original) The method of Claim 19, wherein said step of applying a maskant coating composition comprises applying a radiation curable and substantially solvent-free maskant composition and said step of curing the maskant composition comprises exposing the maskant composition to actinic radiation to form a cured peelable maskant film adhered to the metal substrate.

31. (original) The method of Claim 30, wherein the maskant composition comprises at least one polymerizable monomer or oligomer and a photoinitiator.

32. (original) The method of Claim 31, wherein the at least one polymerizable monomer or oligomer is selected from the group consisting of acrylates, diacrylates, urethane acrylates or diacrylates, and mixtures thereof.

33. (original) The method of Claim 31, wherein the at least one polymerizable monomer or oligomer is selected from the group consisting of isobornyl acrylate, isooctyl acrylate, aliphatic urethane acrylate, aliphatic polyester-based urethane acrylate, aromatic urethane acrylate, siliconized urethane acrylate, polybutadiene urethane diacrylate, and mixtures thereof.

34. (previously presented) The method of Claim 31, wherein the photoinitiator is selected from the group consisting of 1-hydroxycyclohexyl phenyl ketone, bis (2,6-dimethoxybenzoyl)-2,4-,4-trimethylpentyl phosphine oxide, 2-hydroxy-2-methyl-1-phenyl-propan-1-one, trimethylbenzophenone, methylbenzophenone, bis acyl phosphine oxide, and mixtures thereof.

35. (original) The method of Claim 31, wherein the maskant composition further comprises a filler.

36. (original) The method of Claim 25, wherein the filler is selected from the group consisting of talc and fumed silica.

37. (original) The method of Claim 30, wherein said step of exposing the maskant composition to actinic radiation comprises exposing the maskant composition to ultraviolet radiation, black light radiation or visible light radiation.

38. (original) The method of Claim 30, wherein said step of exposing the maskant composition to actinic radiation comprises exposing the maskant composition to ultraviolet radiation by moving the substrate past at least one ultraviolet light or moving the ultraviolet light past the substrate.

39. (previously presented) The method of Claim 30, wherein said step of exposing the maskant composition to actinic radiation comprises exposing the maskant composition to at least one ultraviolet radiation source having a wavelength of about 200 nm to about 450 nm and an intensity of about 120 W/cm^2 to about 185 W/cm^2 .

40. (original) The method of Claim 30, wherein the maskant composition is exposed to radiation at a rate of about 1 to about 10 feet of substrate/minute.

41. (original) The method of Claim 30, wherein the cured maskant film has a thickness of about 5 to about 20 mils.

42. (original) The method of Claim 30, wherein the cured maskant film has a peel strength of about 3 oz./inch to about 30 oz./inch.

43. (original) The method of Claim 30, wherein said step of applying a maskant composition comprises applying the maskant composition by spraying the composition, applying the composition with a roller, applying the composition with a blade, or by dipping the substrate in the maskant composition.

44. (original) The method of Claim 30, wherein the metal substrate has a first side and a second side, and said method comprises:

applying the maskant coating composition to at least a portion of the first side of the metal substrate;

exposing the first coated side of the substrate to actinic radiation to cure the maskant composition and form a cured peelable maskant film adhered to the first side of the metal substrate;

applying the maskant coating composition to at least a portion of the second side of the metal substrate; and

exposing the second coated side of the substrate to actinic radiation to cure the maskant composition and form a cured peelable maskant film adhered to the second side of the metal substrate.

45. (original) The method of Claim 19, wherein the chemical treatment is selected from the group consisting of chemical milling, anodizing and deoxidizing.

46. (original) The method of Claim 19, wherein said subjecting step comprises immersing the substrate in a chemical bath.

47. (original) The method of Claim 19, wherein said scribing step comprising scribing lines with a knife or a laser.

48. (original) A method of protecting selected portions of a metal substrate from chemical exposure, comprising:

applying a maskant coating composition to at least a portion of the surface of a metal substrate, the maskant composition being ultraviolet radiation curable and substantially solvent-free;

exposing the coated substrate to ultraviolet radiation to cure the maskant composition and form a cured peelable maskant film adhered to the metal substrate, the maskant having a peel strength of about 3 oz./inch to about 30 oz./inch;

scribing a predetermined pattern of lines in the maskant film, the scribed lines outlining portions of the maskant film to be removed;

applying a sealant composition to the scribed lines in the maskant film, the line sealant composition being radiation curable and substantially solvent-free;

exposing the line sealant composition to actinic radiation to cure the line sealant composition;

peeling off a portion of the maskant film outlined by the scribed lines; and

immersing the substrate in a chemical milling bath.

49. (original) The method of Claim 48, wherein the metal substrate is an aluminum airplane fuselage panel.

50–63. (cancelled)